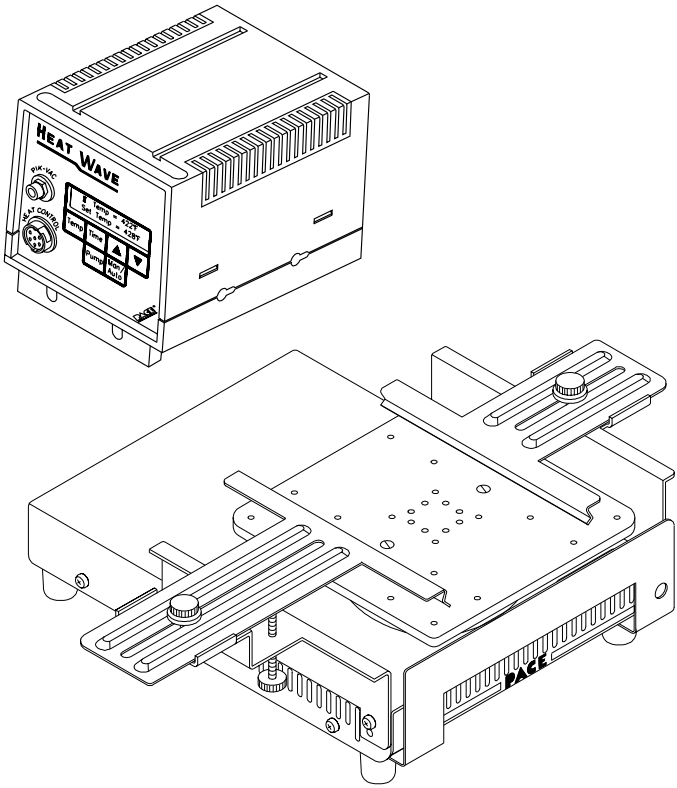
PACE®

ISO 9001 CERTIFIED

HS 200 System



HS 200 Heat Wave System

Operation & Maintenance Manual

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SYSTEM QUICK START

The HS 200 Heat Wave system is very easy to operate and can be quickly set up for use in standard preheating operations. **To begin operation of your new system quickly, read the "Set-Up" and "Quick Start Procedure" instructions detailed on pages 9-13 and page 18 of this manual.** A shaded title bar on each of these pages highlights their location.

For any questions regarding the following instructions, contact your local authorized PACE dealer or contact PACE directly at:

Telephone (301) 490-9860, Fax (301) 604-8782

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General Information

Introduction

Thank you for purchasing the PACE HS 200 Heat Wave system. This manual will provide you with the information necessary to properly set up, operate and maintain the HS 200 Heat Wave system.

The HS 200 is a fully integrated system which provides temperature controlled bottom preheating of high mass electronic assemblies and components. Users can select forced convective (forced air) or conductive (direct hot plate contact) preheating.

The system utilizes the PPS 28 Heat Wave power source which incorporates microprocessor control of system features as defined by the user (e.g., temperature limits, password lock and scheduled operations). An integral motor pump supplies forced air (air pressure) for convective applications and vacuum for component handling operations using the PACE Pik-Vac handpiece.

NOTE

The PPS 28 Heat Wave power source is designed specifically for use with the HS 200 Heat Wave system only. DO NOT use with any PACE accessories other than the Heat Wave Heater Unit.

The Heat Wave heater unit has a wide area hot plate design which protects substrates and components from thermal shock, minimizes board (PCB) warpage and allows rapid solder reflow during rework applications.

Specifications

The HS 200 Heat Wave system operates as a bottom preheater.

The system is available in either the 115 VAC or 230 VAC versions as listed below. The 230 VAC version system bears the CE conformity marking which assures the user that it conforms to all the requirements of council directive EMC 89/336/EEC.

System Power Requirements:

HS 200 - Operates on 97-127 VAC, 50/60Hz
Heater Unit - 300 Watts maximum at 115 VAC, 60Hz
PPS 28 Power Source - 7 Watts maximum at 115 VAC, 60Hz

HS 200E - Operates on 197-264 VAC, 50/60Hz
Heater Unit - 275 Watts maximum at 230 VAC, 50/60Hz
PPS 28E Power Source - 8 Watts maximum at 230 VAC, 50/60Hz

Temperature Range: 38°C to 371°C (100°F to 700°F)

Standard Hot Plate Dimensions: 140mm (5.5 inches) square

Board Holding Capacity:

Standard Board Holder: 20.3cm x 20.3cm (8" x 8")

Optional Board Holder: 45.7cm x 45.7cm (18" x 18")

EOS/ESD Specifications:

Hot Plate-To-Ground Resistance: Less than 2 ohms.

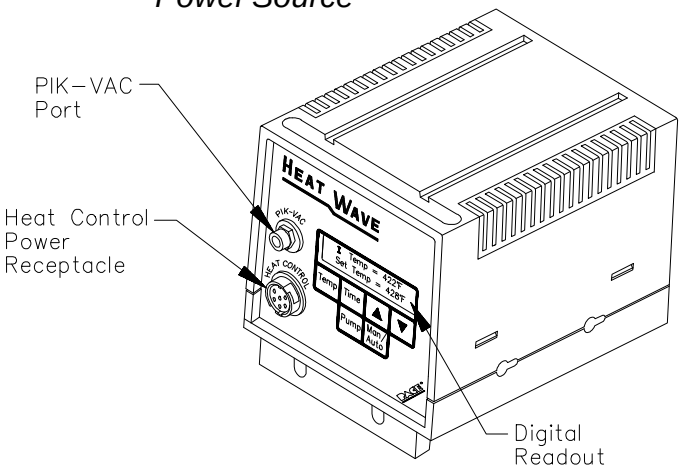
AC Leakage: Less than 2 millivolts RMS from 50Hz to 500Hz.

System Calibration:

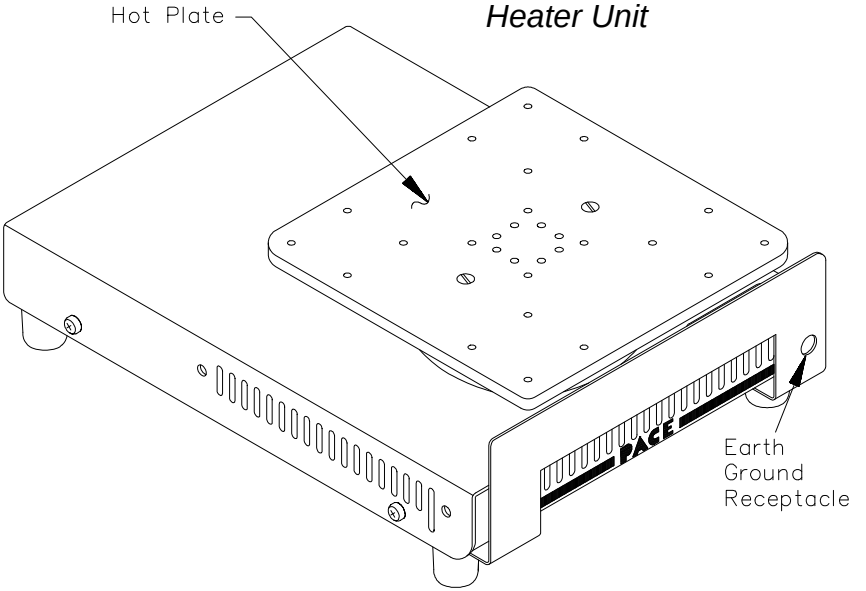
No calibration steps are necessary to maintain the accuracy of the system.

Parts Identification

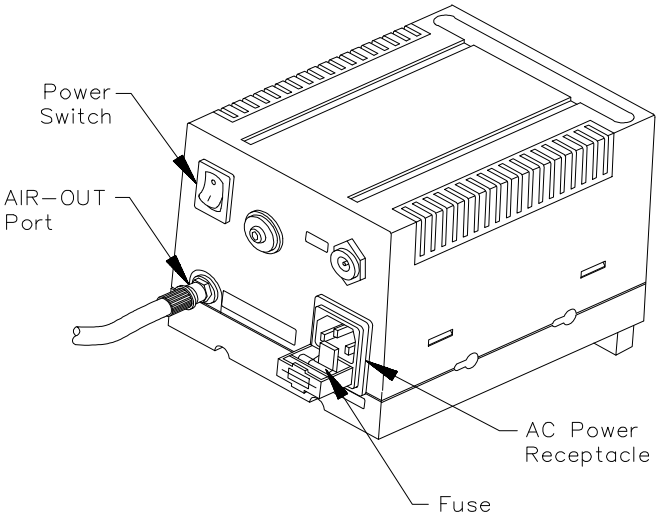
PPS 28/E Heat Wave Power Source



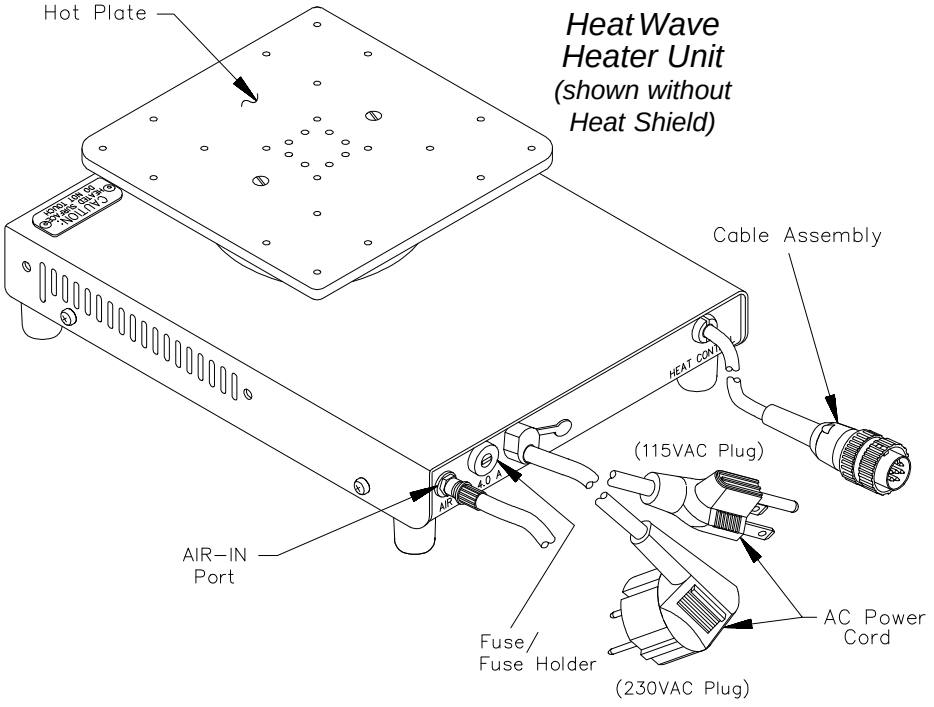
Heat Wave Heater Unit



PPS 28/E Heat Wave Power Source



Heat Wave Heater Unit (shown without Heat Shield)



Safety

The following are safety precautions which personnel must understand and follow when using or servicing this product.

1. To prevent personnel injury, adhere to safety guidelines in accordance with OSHA and other applicable safety standards.

2. Ensure that the Heat Shield is installed before the system is powered up. Installation of the Heat Shield will help prevent accidental touching of the Hot Plate. Severe burns may result if this shield is not installed.

3. The Hot Plate is hot when the system is powered on. Also, the Hot Plate is hot for a period of time after the power is turned off. A "Warming UP" message when the system is powered on or a "Cooling Down" message if the Auto Scheduler powers the system down, may be displayed on the Digital Readout alerting personnel that the Hot Plate is hot. Always treat the Hot Plate as being hot. **DO NOT** touch the Hot Plate or areas adjacent to the Hot Plate of the Heat Wave heater unit. Severe burns may result.

4. Always use the system in the manner described in this manual. Use in applications other than preheating can produce unacceptable results and may cause damage to the system.

5. The PPS 28 Heat Wave power source is designed to power the Heat Wave heater unit only.

6. Always use this system in a well ventilated area. A fume extraction system such as those available from PACE are highly recommended to help protect personnel from fumes.

7. The system should be used in a stable position on a work bench. Ensure that the area below and immediately adjacent to the Hot Plate Heater Unit is clear of flammable objects.

8. Exercise proper precautions when using materials (e.g., fluxes & solder paste). Refer to the Material Safety Data Sheet (MSDS) supplied with each material and follow all safety precautions recommended by the manufacturer.

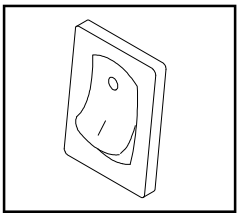
9. **POTENTIAL SHOCK HAZARD** - Repair procedures on this product should be performed by Qualified Service Personnel only. Line voltage parts will be exposed when the equipment is disassembled. Service personnel must avoid contact with these parts when troubleshooting the system.

System

Set up the HS 200 Heat Wave system using the following steps and associated drawings.

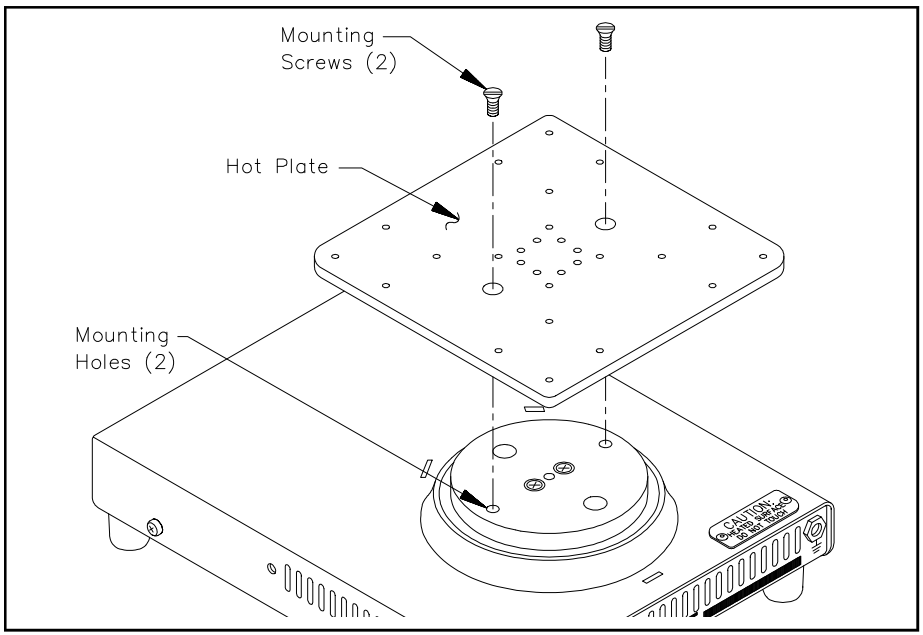
1. Store the shipping container(s) in a convenient location. These containers can be reused to prevent damage if you store or ship the system.

2. Place the Power Switch (on rear of Heat Wave power source) in the "OFF" or "0" position.



Hot Plate Installation

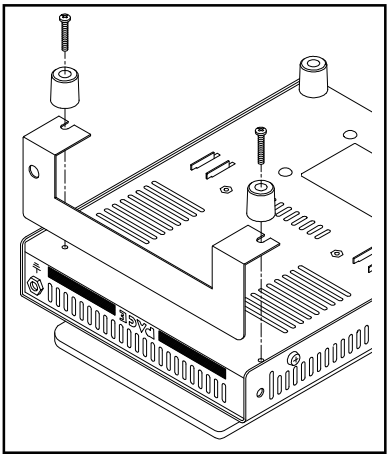
3. Place the Hot Plate in position on the Heat Wave heater unit with its 2 mounting holes in alignment with the 2 threaded Mounting Holes on the heater assembly. Attach the Hot Plate to the heater assembly using the 2 enclosed Mounting Screws. Refer to illustration below.



4. Place the PPS 28 Heat Wave power source in position adjacent to the heater unit.

Heat Shield Installation

5. Install the Heat Shield onto the Heater Unit in the following manner:



   a) Ensure that the Heater Unit is at room temperature.

   b) Place Heater Unit upside down (Hot Plate down) on a suitable work surface Position unit with the Earth Ground Receptacle facing you.

   c) Remove the 2 Mounting Scews shown that secure the Rubber Feet to the bottom, front of the Heater Unit. DO **NOT** remove screws that secure the remaining 2 Rubber Feet.

   d) Place the Heat Shield in position as shown between the 2 Rubber Feet and the Heater Unit chassis.

   e) Install the 2 Mounting Screws removed in step 5c to secure the Rubber Feet and Heat Shield to the Heater Unit chassis.

Board Holder Mounting

The HS 200 Heat Wave system is supplied with a standard Board Holder which will accomodate PCB sizes up to 20.3cm x 20.3cm (8" x 8"). An optional Board Holder (part number 7900-0045) is available which accomodates PCB sizes up 45.7cm x 45.7cm (18" x 18").

6. If the optional Board Holder has been purchased, mount the holder to the Heater Unit using the instructions included with the holder.

7. If you wish to use the standard Board Holder included with your system, perform the following procedure. Use the illustrations as a guide.

   a) Position the heater unit as shown.

   b) Mount large bracket (item ①) to the side of the heater unit using 2 mounting screws (item ②).

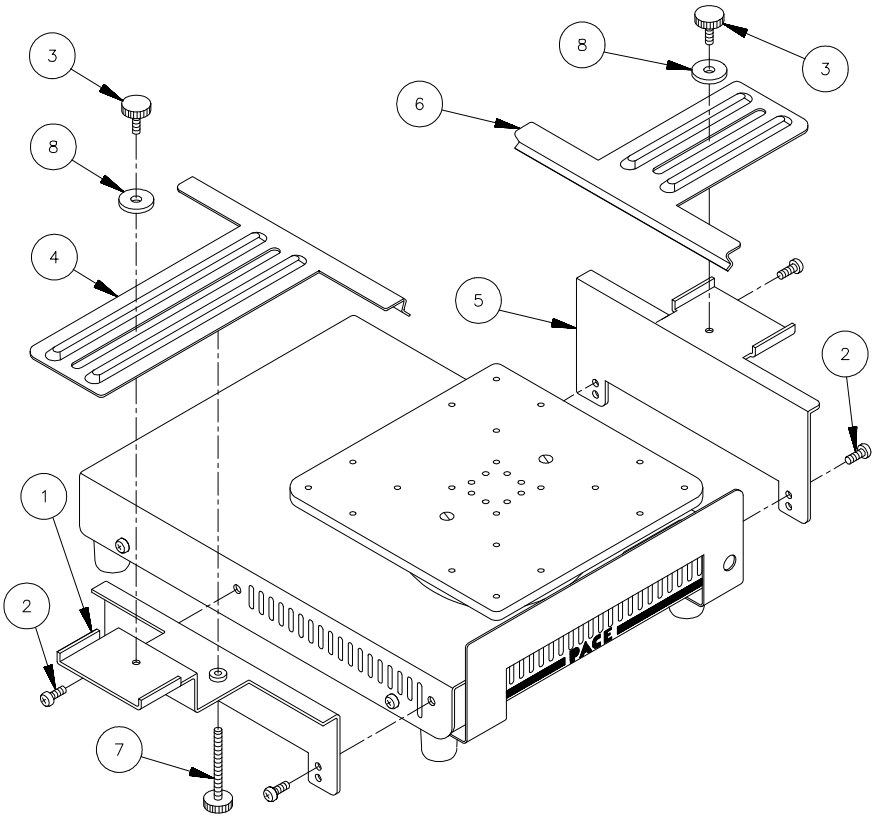
c) Place long holding clamp (item ④) in position on bracket (item ①). Secure clamp in position using locking screw (item ③) and flat washer (item ⑧).

d) Install leveling screw (item ⑦). Adjust leveling screw until its end just touches the bottom of the long holding clamp (item ④).

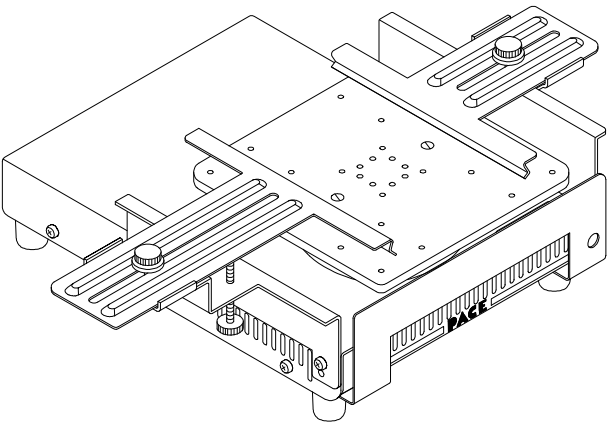
e) Mount small bracket (item ⑤) to the side of the heater unit using 2 mounting screws (item ②).

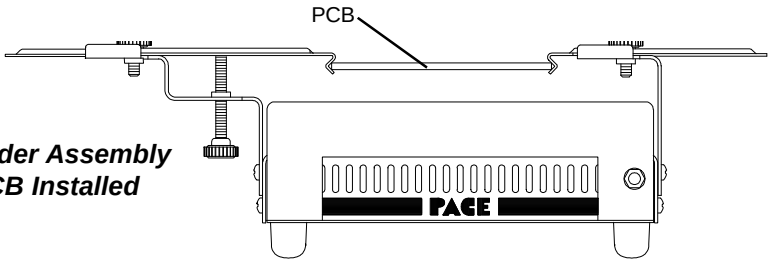
f) Place short holding clamp (item ⑥) in position on bracket (item ⑤). Secure clamp in position using locking screw (item ③) with flat washer (item ⑧).

Board Holder Assembly Parts Locator



Assembled Board Holder





Board Holder Assembly With PCB Installed

Heater Unit/Power Source Connection

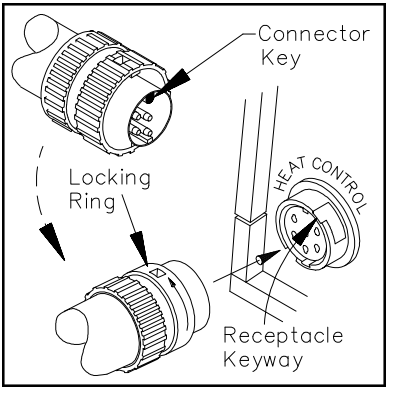
8. Connect the Heater Unit Cable Assembly connector plug to the **HEAT CONTROL** Power Receptacle in the following manner:

   a) With the Connector Key end facing the power source, turn the Locking Ring fully counterclockwise.

   b) Align the Connector Key with the Receptacle Keyway.

   c) Insert the connector into the **HEAT CONTROL** Power Receptacle.

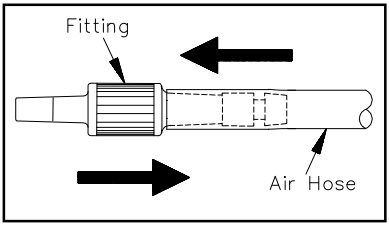
   d) Turn the Locking Ring fully clockwise to secure in place.



Air Hose Connection

Two air hoses (and fittings) are included with the system. One air hose provides air pressure for convective preheating from the Heat Wave power source to the Heater Unit. The second air hose provides vacuum to the Pik-Vac wand for component handling.

9. Prepare 2 Air Hose assemblies by installing a male quick disconnect hose mount Fitting to each end of the supplied air hoses. Insert the ribbed end of the Fitting into the Air Hoses.



10. Connect one air hose assembly between the power source **AIR OUT** Port and the **AIR IN** Port on the rear panel of the Heater Unit (see drawing on page 7).

11. Connect the remaining air hose assembly between the **PIK-VAC** Port of the power source and the PIK-VAC handpiece.

System Power Up

12. Insert the female end of the loose power cord into the AC Receptacle of the Heat Wave power source.

13. Plug the prong ends of both the Heat Wave power source and the Heater Unit into a 3 wire grounded AC supply receptacle. The system is now ready for operation.

CAUTION

To insure operator safety, the AC supply receptacle must be checked for proper grounding before initial operation.

14. Read the "Quick Start Procedure" section of this manual thoroughly before operating the system.

Preheat Guidelines

Introduction

The Heat Wave system provides process control to meet your specific requirements. Follow these steps and use the following tables as a guideline to set the process parameters for your particular applications:

1. Determine your basic board type:
   a. Simple, Double Sided Board
   b. SMT/Thru-Hole Board with approximately 6 or fewer internal layers
   c. High Mass Board with approximately 7 or more internal layers
2. Determine your desired preheat temperature. The tables provide data for commonly used preheat temperatures of 80 °C (176 °F), 100 °C (212 °F) and 120 °C (248 °F).
3. To preheat quickly (yet always slower than 3 °C per second), see Table 1.
4. To preheat (always slower than 3 °C per second) and soak the board area prior to reflow, see Table 2. Using this method:
   a) the internal pump delivers hot air for quick ramp preheating.
   b) when the pump stops, the radiant convection of the hot plate provides a controlled soak at the desired preheat temperature.

NOTE

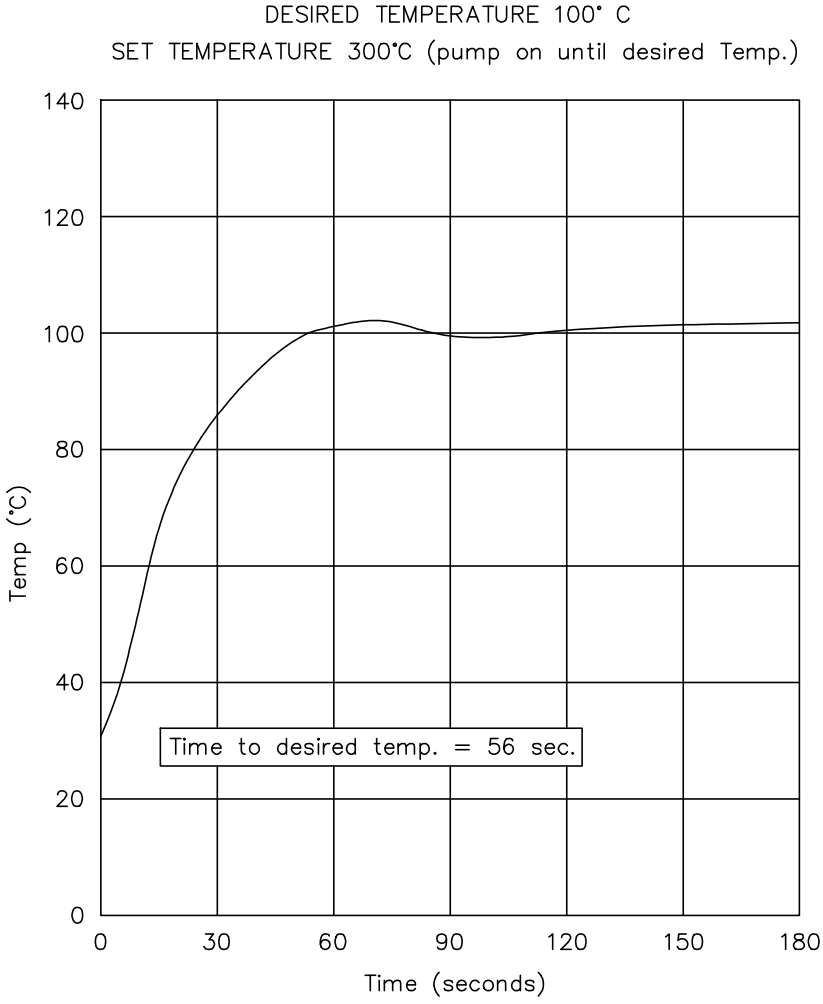
Thermal characteristics of every board assembly will be different. The following tables provide a base starting point for the development of the exact preheating parameters for your rework process.

When developing processes for removal/replacement of components, PACE recommends the use of embedded thermocouples on the test board to ensure optimum results.

The following graph depicts a typical preheat and soak profile for a circuit board.

Setting the parameters in Table 1 will maximize the temperature ramp rate (3°C per second or slower). Rework can then be performed immediately when the pump turns off. The radiant heat from the hot plate will continue to slowly increase the temperature of the workpiece.

Use the parameters in Table 2 to achieve a true ramp and soak temperature profile as shown below. In this case, the radiant heat stabilizes the workpiece at the desired preheat temperature.



Safe, Rapid Preheating

To preheat quickly at safe ramp rates, set the following temperature and pump run-time parameters for the appropriate board type. These settings will quickly preheat the repair area over the center of the Heat Wave plate to the desired temperature (yet always slower than 3 °C per second). The entire board area over the Heat Wave plate will also be preheated, but at a slightly slower rate.

This method allows the operator to quickly perform any necessary rework tasks. The temperature on the board may continue to rise (at a slower rate) even after the pump turns off.

Desired Preheat Temp.	Heat Wave Set Temperature	Pump Run-time
Simple, Double Sided Board		
80°C (176°F)	371°C (700°F)	28 seconds
100°C (212°F)	371°C (700°F)	36 seconds
120°C (248°F)	371°C (700°F)	54 seconds
SMT/Thru-Hole Boards With Up To 6 Internal Layers		
80°C (176°F)	371°C (700°F)	44 seconds
100°C (212°F)	371°C (700°F)	64 seconds
120°C (248°F)	371°C (700°F)	112 seconds
High Mass Board With 7 Or More Internal Layers		
80°C (176°F)	371°C (700°F)	56 seconds
100°C (212°F)	371°C (700°F)	114 seconds
120°C (248°F)	371°C (700°F)	190 seconds

Table 1. Rapid Preheat Guidelines

Preheat & Soak

The Heat Wave can be used to preheat and soak a circuit board before reflow takes place. This helps to bake out the laminate and to equalize temperatures across the repair area.

To preheat at a safe ramp rate, followed by a soak time (repair area of board remaining within ±10 °C of desired preheat temperature), set the following temperature and pump run-time parameters for the appropriate board type.

This method provides quick ramp preheating. When the pump stops, the radiant convection of the hot plate provides a controlled soak at the desired preheat temperature. This prevents the board from heating more than 10°C over the desired temperature.

Desired Preheat Temp.	Heat Wave Set Temperature	Pump Run-time
Simple, Double Sided Board		
80°C (176°F)	250°C (482°F)	50 seconds
100°C (212°F)	300°C (572°F)	56 seconds
120°C (248°F)	320°C (608°F)	72 seconds
SMT/Thru-Hole Boards With Up To 6 Internal Layers		
80°C (176°F)	250°C (482°F)	114 seconds
100°C (212°F)	300°C (572°F)	130 seconds
120°C (248°F)	340°C (644°F)	180 seconds
High Mass Board With 7 Or More Internal Layers		
80°C (176°F)	250°C (482°F)	208 seconds
100°C (212°F)	300°C (572°F)	212 seconds
120°C	360°C	206 seconds

Table 2. Preheat & Soak Guidelines

Quick Start Procedure

The following procedure assumes that the Heater Unit Hot Plate is at room temperature and the power source is in the Manual Mode with no installed Password (as received from factory). If not, displayed messages may be different.

1. **Set-Up** - Ensure that the Set-Up procedure has been performed. Check the following:
   a) Heater Unit connection to the Heat Wave power source.
   b) Power cord connections (2) between the house AC supply and both the Heater Unit & power source.
   c) Ensure that the system is properly mounted (on standard Board Holder or on large Board Holder).
2. **Air Hose Connection** - If you wish to use the Convective (forced air) method of preheating, connect the Air Hose Assembly between the power source **AIR OUT** Port and the Heater Unit **AIR IN** Port (see illustrations on page 21).
3. **Apply Power** - Turn the Power Switch (on power source) to the “ON” (“1”) position. The Digital Readout will display "Heat Wave" and then a Version number for 2 seconds each. Then, a "Warming Up" message (with a countdown time) or "System is OFF" message will be displayed.
4. **Adjust Temperature** - Press and release the **TEMP** Key. Press and release the Scroll UP (▲) Key to increase or the Scroll Down (▼) Key to decrease the desired temperature. Press and release the **TEMP** Key. The Digital Readout will now display the "Warming Up" and time out message. When the system times out, the Digital Readout will display the actual Hot Plate temperature. Allow time for the temperature to stabilize at the set temperature.
5. **Install PCB for Repair** - Place the PCB to be repaired in the Board Holder. Position PCB repair area directly over the center of the Hot Plate. When repairing large PCBs, you may wish to install the optional PCB Supports supplied in kit P/N 6993-0197-P1.
6. **Actuate Motor Pump** - Optional Step - Press and release **Pump** Key to apply convective flow of hot air to PCB repair area. Press and hold the **Pump** Key for 2 seconds, then release to allow adjustment of the pump run time.

IMPORTANT

PACE recommends that you not read the “Set-Up Mode” section until after you feel comfortable with manual operation of the system. Please read the “Operation” section thoroughly before changing any system settings.

Introduction

The HS 200 Heat Wave system is very easy to operate. As received from the factory, the system can be quickly set up for use in standard preheating operations. Simply perform the Quick Start Procedure (page 14) to begin system operation. For operations requiring user defined controls, use this portion of the manual.

Definitions

Auto Mode - Mode in which the system will turn on and off for periods of operation as determined by the user-defined Auto Schedule settings in system memory.

Auto Off - Safety feature which turns power off after 12 hours of continuous use in the Manual Mode. This feature is enabled or disabled in the Set-Up Mode.

Auto Schedule - Feature which enables the operator (when in Set-Up Mode) to program the system to turn on for a specific time period when in the Auto Mode. The operator can select enable or disable for any day(s) of the week .

Conductive Preheating - Preheating a board (PCB) by transferring heat directly from the hot plate to the board.

Convective Preheating - Preheating a board (PCB) by transferring heat using forced air through the hot plate and onto the board. With convective preheating there is no direct contact between the hot plate and the board.

Manual Mode - Mode in which the system is turned on and off as determined by the operator.

Operating Temperature - The true temperature at which the hot plate operates at any given time. This temperature is displayed on the Digital Readout ("Temp = XXX") in normal operation (Temperature Display Mode).

Password - Feature which, when enabled, will prevent unauthorized alteration of stored system parameters and feature settings.

Set Temperature - The operator selected idle hot plate temperature ("Set Temp = XXX") entered into the system memory.

Set-Up Mode - Mode of operation in which the operator can quickly and easily adjust the system parameters (e.g., temperature limits, password, auto schedule).

Temperature Display Mode (normal operation) - Normal operating mode of the system in which the actual hot plate temperature is displayed.

Time Protected - System requires that the Password stored in system memory be entered before the current time setting can be altered.

Time Unprotected - Current time setting can be changed without Password entry.

Operation

Overview

The following is a brief summary of basic system operational functions.

1. **Temp** Key - Press and release to set a desired Hot Plate temperature using the Scroll keys to adjust. Also used in Set-Up Mode.

2. **Time** Key - Press and release to display time of day and to select time (hours or minutes) for change.

3. Scroll Up (▲) Key - Press and release to increase Set Temperature, Time or Day of Week settings.

4. Scroll Down (▼) Key - Press and release to decrease Set Temperature and time settings.

5. **Pump** Key - Press and release to turn pump on or off for Convective Heating operations and for component handling operations using the Pik-Vac handpiece. Pump run time is adjustable from 10 seconds minimum to 1 hour maximum or for continuous operation. As received from the factory, the pump will run continuously when the key is pressed.

6. **Man/Auto** Key - Toggles system between Auto and Manual Modes.

7. Digital Readout - Provides a 2 line LCD display of system information. The Digital Readout will display:

   a) ”Heat Wave” for 2 seconds on initial power up.

   b) The software version of the Heat Wave power source for 2 seconds.

   c) A “Warming Up” or a “Cooling Down” message plus the Set Temperature and estimated time (in minutes and seconds) to reach Set Temperature.

   d) An “On” & "Off" time message for 5 seconds and then "Set Schedule" if the system is in Auto Mode with no Set Schedule.

   e) Temperature in °C or °F (programmable in Set-Up Mode).

   f) The Operating Temperature when it stabilizes. The system is now in Temperature Display Mode (normal operation).

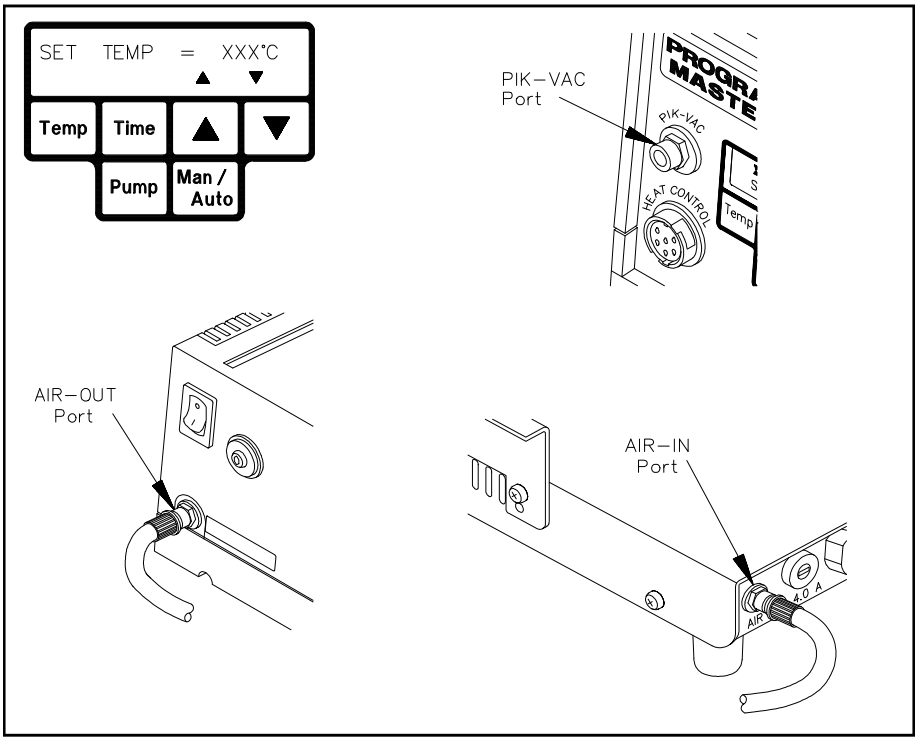
g) An hour glass graphic to indicate that the 12 hour timer is active and the system will automatically power down if used for 12 continuous hours of manual operation.

h) A variety of text messages to denote system status (e.g., “Open Sensor Check Heater” if the Heater Unit Cable Assembly is not connected to power source).

8. **AIR OUT** Port - Connect the air hose assembly between this port and the **AIR IN** Port of the Heater Unit to supply forced air when utilizing Convective Heating. Pump must be turned on when preheating in this manner.

9. **AIR-IN** Port - See **AIR OUT** Port above.

10. **PIK-VAC** Port - Connect the air hose assembly between this port and the Pik-Vac handpiece. Used to pick and place components.



Factory Settings

The HS 200 Heat Wave system comes equipped with a number of features which may be adjusted, enabled or disabled as desired by the user. Listed below are the features and factory settings of each. To change and/or learn about any of these features, refer to the applicable part of the "Operation" or "Set-Up Mode" portions of this manual.

FEATURE	FACTORY SETTING
Password	No Stored Password
Hot Plate Size	140mm (5.5 inch) square
Temperature Scale (°C/°F)	°F
"Lo" (lower) Temperature Limit	38°C (100°F)
"Hi" (upper) Temperature Limit	371°C (700°F)
Clock Format	12 Hour
Auto Scheduler	All Days & Times Disabled
Auto Off	Disabled
Pump Run Time	Continuous Operation
Time To Auto Off (manual mode, continuous operation)	12 Hours, Not Adjustable
Time Protection	Disabled
Set Temperature (of Hot Plate)	"OFF"

Table 3. Factory Settings

Password

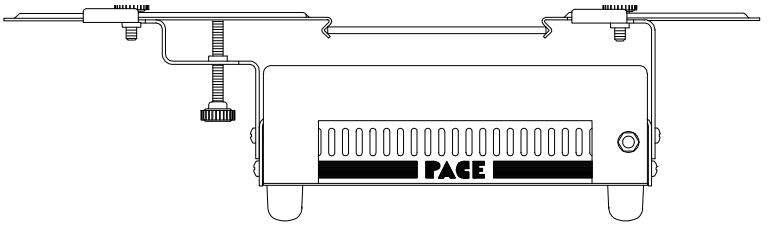
The Password feature of the HS 200 Heat Wave system, when activated, will prevent unauthorized alteration of stored system parameters and feature settings. If a Password has been installed, the Digital Readout will display an instruction to enter a Password (a 4 key sequence of the keys on the front panel of the power source) when a setting change is attempted or when entering the Set-Up mode.

Entry of the correct Password at this point will allow the operator to proceed with the desired changes. The Password protection will be reactivated if the system is turned off and then back on. Refer to the "Set-Up Mode" section of this manual for instructions on entering, changing or removing a Password.

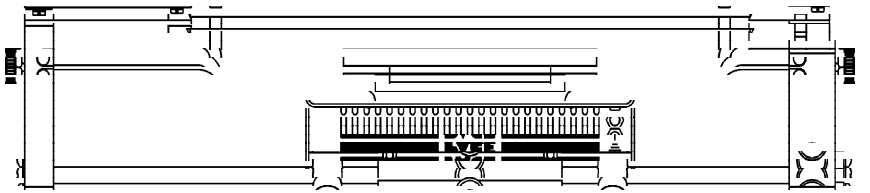
Board Set-Up

A PC Board can be may be placed or clamped in position on the Heater Unit utilizing the standard or optional Board Holder accessory. When working with large PCBs, you may wish to install the PCB Supports supplied in kit part number 6993-0197-P1.

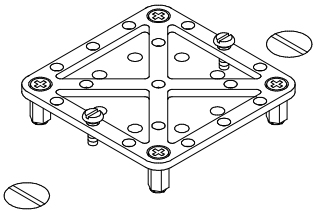
Standard Board Holder Mounting
(see pages 10-11 for details)



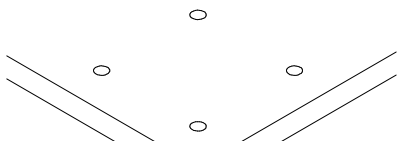
Optional Board Holder Mounting
(See instructions with Optional Board Holder for details)



PCB Support
(See instructions with PCB Support Kit for details)

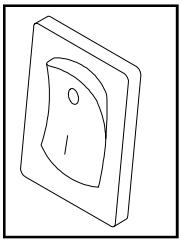


Heat Wave
Hot Plate



The following instructions assume that the Heater Unit Hot Plate is at room temperature and the power source is in the Manual Mode with no installed Password. If not, displayed messages may be different.

Power Up



1. Turn the Power Switch ON (“1”).

Panel Controls

2. The Digital Readout will now display “Heat Wave” for 2 seconds and then the microprocessor revision for 2 seconds.

NOTE

If the **HEAT CONTROL** Power Receptacle does not have the Cable Assembly connector plug (from Hot Plate) attached, “Open Sensor Check Heater” will be displayed on the Digital Readout.

3. The system has 2 modes of operation: Manual and Auto. The system will power up to the same mode as when power was last turned off. The display on the Digital Readout is determined by the following:
   a) With the system in the Manual Mode, or in Auto Mode with a set schedule, a “Warming Up ... Set Temp” message will be displayed. Allow time for the Hot Plate to reach the Set Temperature.

NOTE

The system is shipped from the factory to enter Manual Mode and will display a "System is OFF" message on initial power up. A “Set Schedule” message will be displayed if in Auto Mode & the Auto Schedule is disabled. To enable the Auto Schedule, refer to the Set-Up Mode section of this manual.

   b) An “OFF” or “ON” time or a "Warming ... Set Temp" message will be displayed if the system is in the Auto Mode and a schedule has been stored in system memory.

   c) If the system is in the Auto Mode but no schedule is enabled, the current time and a “Set Schedule” message will be displayed. No power is being applied to the Hot Plate.

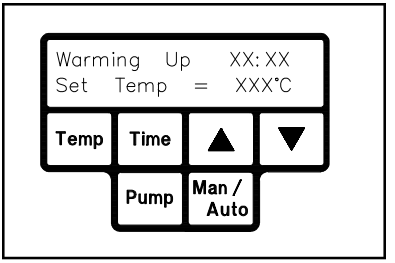
Manual Mode

4. If the system is displaying an “ON”, “OFF” or "Set Schedule" message (Auto Mode), press the **Man/Auto** Key to change to Manual Mode.

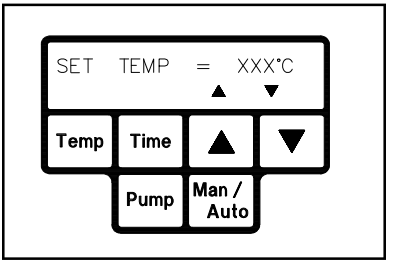
NOTE

If a "System is OFF" message is displayed, press and release the **Temp** Key & use Scroll keys to adjust desired Hot Plate temperature. Press and release the Temp Key or wait 5 seconds; turn Power Switch OFF ("0") then back ON ("1"). The "Warming Up" message will now be displayed.

5. Notice in the upper right corner of the “Warming Up” display is a timer clock. This clock is displaying the estimated time remaining to reach Set Temperature in minutes and seconds. The bottom line displays the Set Temperature.



6. When the temperature of the Hot Plate nears the Set Temperature, the actual temperature will be displayed. The displayed temperature will increase to a point higher than the Set Temperature. This is NORMAL. Observe the Digital Readout as the displayed temperature decreases and settles in at the Set Temperature.

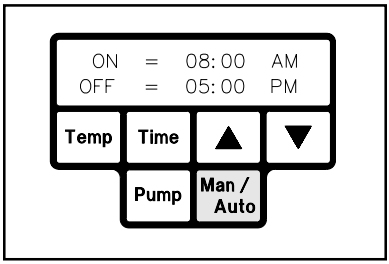


7. The system will now maintain the Set Temperature unless one of the following occurs:
   a) If the Auto Off feature is enabled, the system will turn off after 12 hours of continuous operation.
   b) If the Set Temperature is lowered, the temperature will decrease to the new setting.
   c) If the system Power Switch is turned off.

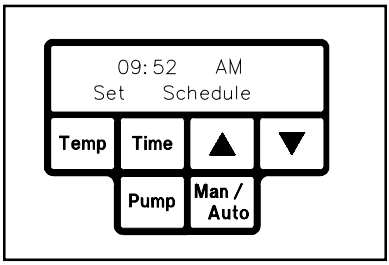
Auto Mode

In the Auto Mode, the system will turn On and Off at predetermined times entered in the Set-Up Mode. The Auto Schedule portion of the Set-Up Mode routine allows the operator to set a time for system power up and power down. This selected time period is then enabled or disabled for each individual day of the week. For example, a power on time period of 8 am to 5 pm can be enabled for Monday through Friday but the system will remain off (disabled) Saturday and Sunday.

8. Press and release the **Man/Auto** Key. The system is now in the Auto Mode. A time "On = ... Off = ..." message will be displayed for 5 seconds.

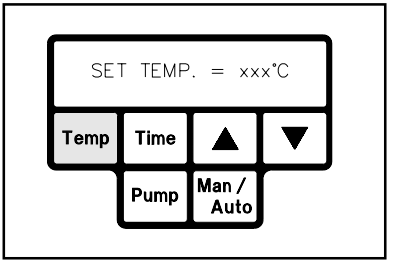


9. The Digital Readout will now display the actual temperature (Temperature Display Mode) plus one of the following:
   a) The time the system will turn off (if in a scheduled On period).
   b) The time the system will turn On (if in a scheduled Off period) if any day has been enabled.
   c) If all days are disabled, a "Set Schedule" message will be displayed.



Adjusting Set Temperature

10. Press and release the **Temp** Key. The Set Temperature is now displayed on the Digital Readout. If no other Key is pressed within 5 seconds, the system will revert to the Temperature Display Mode (normal operation). Allow time for the system to change back.



11. Press and release the **Temp** Key, then, immediately press and hold the Scroll Up (▲) Key. Observe the display as the Set Temperature increases first in increments of 1° and then in increments of 10°. Release the key.

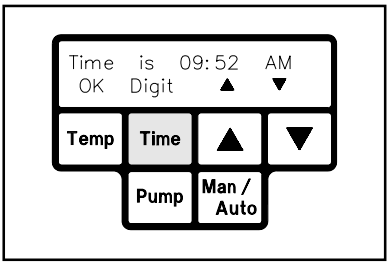
12. Press and hold the Scroll Down (▼) key. Observe the display as the Set Temperature decreases first in increments of 1° and then in increments of 10°. Release the key; press and release the **Temp** Key (or wait 5 seconds).

NOTE

The Set Temperature can only be within the set temperature limits. If a limit (upper or lower) is reached, the lower limit would display "Off"; the upper limit would not allow the Set Temperature to exceed that limit. Temperature limits can be adjusted in the Set-Up Mode.

Adjusting Time/Day of Week

13. Press and release the **Time** Key. If the system is Time Protected, the Digital Readout will display a request to enter the Password before altering the time setting; enter the Password. The current time will now be displayed along with a bottom line display. If no other Key is pressed within 5 seconds, the system will revert to the Temperature Display Mode (normal operation). Allow time for the system to change back.



NOTE

The time will be displayed in either a 12 hour or 24 hour format as determined in the Set-Up Mode. Also, throughout the Time setting process (steps 14-19), a 5 second timeout between any key actuations will cause the system to revert to Temperature Display Mode (Normal Operation).

14. Press and release the **Time** Key twice; the hour portion of the time will start to flash.

15. Use the Scroll Up (▲) and Scroll Down (▼) Keys to change the hour. Ensure that the displayed hour is correct before continuing.

16. Press and release the **Time** Key again. The tens digit of the minutes display will begin to flash. Use the Scroll Up (▲) and Scroll Down (▼) Keys to change the minutes display in increments of 10. Ensure that the displayed minutes is correct before continuing.

17. Press and release the **Time** Key again. The single (ones) digit of the minutes display will begin to flash. Use the Scroll Up (▲) and Scroll Down (▼) Keys to change the minutes display in increments of 1. Ensure that the displayed time is correct before continuing.

18. Press and release the **Temp** Key. The day of the week is now displayed. Immediately press and release the Scroll Up (▲) Key several times and watch as the day changes. Ensure that the displayed day is correct before continuing.

19. Press and release the **Temp** Key again or allow the system to time out (after 5 seconds) and revert to normal operation.

NOTE

Any changes to the time or day of the week are stored in system memory when exiting the Set-Up Mode and the system changes back to Normal Operation (Temperature Display Mode).

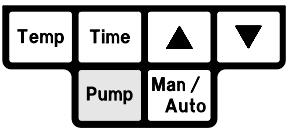
Pump Operation

20. The power source has an integral motor pump which provides forced air for Convective Heating and vacuum for component handling operations.

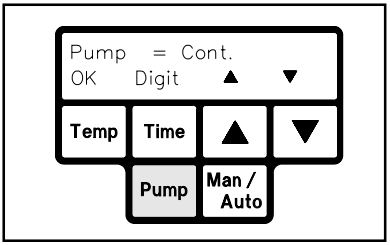
NOTE

The motor pump is not designed for other operations such as solder extraction. DO NOT use the motor pump for any applications other than those described in this manual.

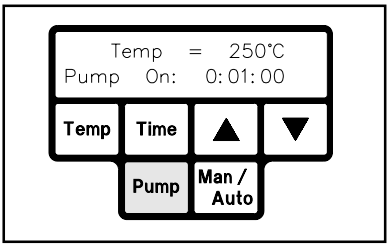
To activate the pump, press and release the **Pump** Key. Press and release the key again to terminate pump operation.



The Pump run time is adjustable from 10 seconds minimum to 1 hour maximum or for continuous operation. As received from the factory, the pump will run continuously when the key is pressed.

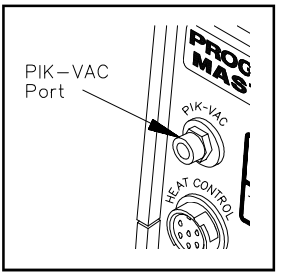


21. Press and hold the **Pump** Key for 2 seconds. The digital Readout will now display current Pump run time as "Cont." (Continuous) or in hours, minutes, and seconds.
22. Press and release the **Time** Key.
23. Press and release the Scroll Down (▼) and Scroll Up (▲) Keys several times. Notice the Pump run time change from Continuous to 1 (hour) to 0 hours. When 0 hours is displayed the minimum time displayed will be 10 seconds.
24. If the Pump run time is "Cont.", press and release the Scroll Down (▼) Key.
25. Press and release the **Time** Key several times. Notice the display changes with each press and release of the Key. The hour digit will flash, then the minutes times 10 digit, then the minutes digit, then the seconds times 10 digit, then the seconds digit. When the digit is flashing, that time segment is subject to change by use of the Scroll Keys (▲ & ▼).
26. Adjust the Pump run time to 1 minute (as an example) using the Time Key plus the Scroll Up and Scroll Down Keys.
27. Press and release the **Temp** Key to return to normal operation.
28. Press and release the **Pump** Key. The Pump is now activated. Observe the displayed Pump run time as the timer counts down to 0. Upon reaching zero, the pump will turn off. Also, the pump will turn off immediately if the Pump Key is pressed a second time when the pump is operating.



29. Adjust the Pump run time to the time desired for your application using steps 21 thru 28 as a guide.

Pik-Vac Operation

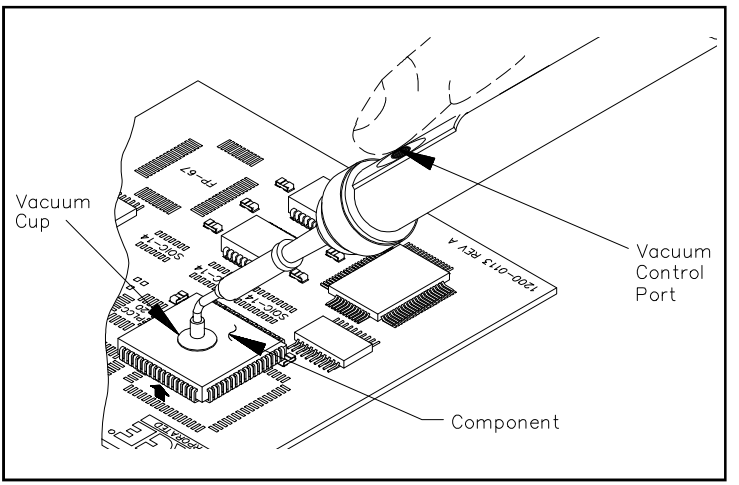


1. Connect the Pik-Vac air hose assembly between the **PIK-VAC** Port and the back of the Pik-Vac handpiece.
2. Install the metal tip and desired Vacuum Cup onto the end of the handpiece.
3. Turn the Power Switch (on rear of power source) ON (“1”).
4. Press and release the **Pump** Key to activate vacuum flow.

NOTE

The Pump run time should be set for continuous operation when using the Pik-Vac handpiece.

5. Grasp the handpiece as you would a pencil with the Vacuum Cup pointing down and the Vacuum Control Port pointing up.
6. Place the Vacuum Cup gently on the top surface of the component body. Caution must be taken to avoid bending of leads on fine pitch devices.
7. Place one finger over the Vacuum Control Port. Vacuum is now being applied to the component body.
8. Gently lift the component from its position.



9. Lower the component in position (illustration depicts placement of component on land pattern).
10. Slide the finger from the Vacuum Control Port to release the component.
11. Press and release the **Pump** Key to stop vacuum flow.

Introduction

The menu driven Digital Readout of the HS 200 Heat Wave system in the Set-Up Mode allows you to easily customize your system. In most cases, the operator is directed as to which key(s) to press in order to proceed. In cases where specific instructions are not displayed, simply press and release the **Temp** Key to proceed to the next step.

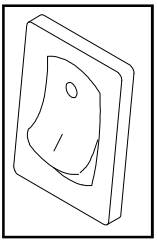
No calibration steps are necessary to maintain the accuracy of the system.

In Set-Up Mode, you can:

1. Enter, remove, or change a Password.
2. Select Hot Plate standard size or enter temperature offset constant for custom size in use on Heater Unit.
3. Set the Default Temperature scale to °C or °F as desired.
4. Change the Upper and Lower Temperature limits of the Hot Plate.
5. Select a 12 hour or 24 hour time clock.
6. Program Auto Schedule for power on/off period and enable or disable for each day of the week.
7. Enable or disable the Auto Off feature.

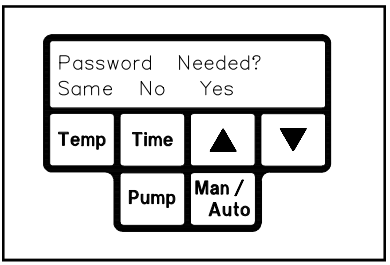
Operation

Entering Set-Up Mode



1. Place the Heat Wave Power Switch in the OFF (“0”) position.

2. Press and hold the **Temp** and Scroll Down (▼) Keys together.



3. Place the Power Switch in the ON (“1”) position. The Digital Readout will display “HeatWave”, change to read “Version XXXX” and the change again to read “Password Needed?”

4. Release the Temp and Scroll Down (▼) Keys. The system is now in the Set-Up Mode. “Enter Password" will be displayed if a Password is currently stored in system memory.

Password

5. If a Password has been previously stored in system memory, enter the 4 key sequence Password; an asterisk (✶) will be added to the display as each key is actuated.

> **NOTE**
>
> If an incorrect Password sequence is entered, the system will immediately revert to normal operation.

6. At this point the Digital Readout will ask you:
   a) If you would like to retain the "Same" Password (if previously stored) in the system. If you do, press the **Temp** Key (directly beneath "Same").

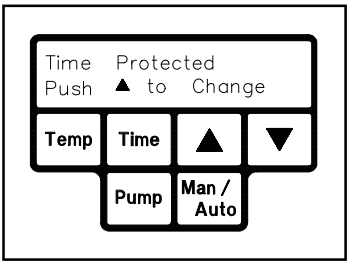
   b) If you do not wish to have a Password stored in the system, press the **Time** Key (directly beneath "No"). Any previously stored Password will be removed from the system.

   c) If you wish to enter a new Password, press the Scroll Up (▲) Key (directly beneath "Yes"). The Digital Readout will now display "Enter New Password". Enter a new 4 key sequence Password. As each key is pressed, an asterisk (✶) will be displayed. Once the fourth key is pressed, a "Time Protected" or "Time Unprotected" message will be displayed if the system has a Password stored in memory.

Time Protection

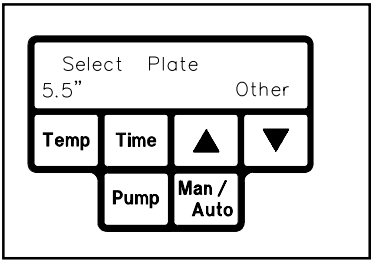
7. If a "Time Protected" or "Time Unprotected" message is displayed (Password stored in system memory), the Scroll Up (▲) Key can be pressed to toggle between the two messages. If you wish to require the operator to enter the stored Password before altering the time setting in normal operation, the "Time Protected" message should be displayed. Press and release the **Temp** Key to continue.

   The message displayed in this illustration, indicates that the system clock can not be changed without entering the password.



Hot Plate Temperature Offset

8. A "Select Plate" message will be displayed. The standard Hot Plate size is 140mm (5.5") square; this is the default size. The system has a permanently stored temperature offset constant which automatically compensates for temperature losses between the temperature sensor and the Hot Plate. This ensures that the plate temperature matches the set temperature. If your system has a different Hot Plate, actuate the Scroll Down (▼) Key. Then, use the scroll keys to adjust the temperature offset for your Hot Plate.

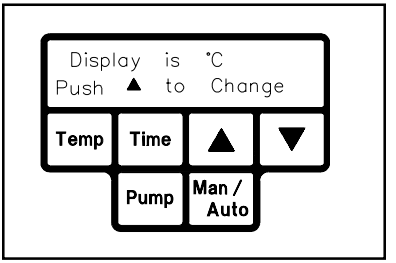


NOTE

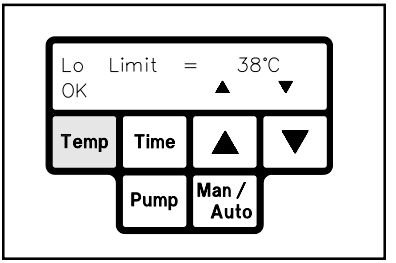
The Digital Readout will display the standard Hot Plate size as 140mm if temperature is being displayed in °C or as 5.5" when temperature is displayed in °F.

Temperature Limits

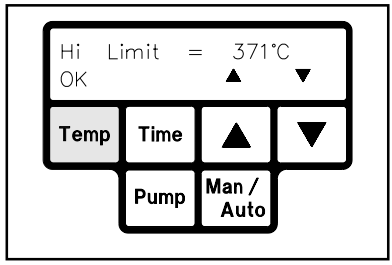
9. Press and release the **Temp** Key. The Digital Readout will now display whether temperature will be shown in °C or °F. Press and release the Scroll Up (▲) Key to change.



10. Press and release the **Temp** Key. The Low ("Lo") Temperature Limit setting is now displayed. Use the Scroll keys to adjust.

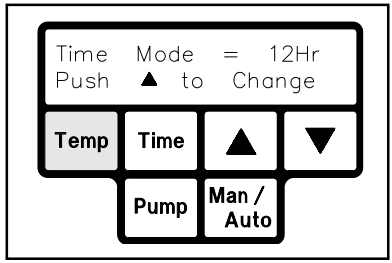


11. Press and release the **Temp** Key. The High ("Hi") Temperature Limit setting is now displayed. Use the Scroll keys to adjust.



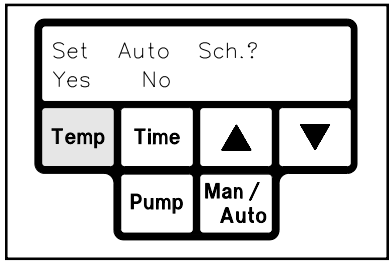
Time Display

12. Press and release the **Temp** Key. The Time Mode setting is now displayed. With a "12Hr" setting, the displayed time will be the same as on a digital clock (with AM and PM suffixes). A "24Hr" setting will display 24 hour (military) time. Use the Scroll Up (▲) Key to change the displayed time mode.

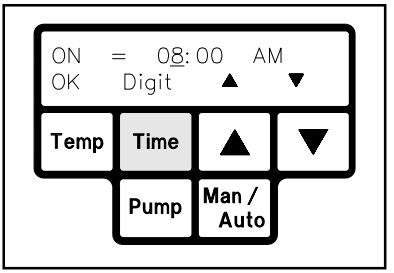


Auto Schedule

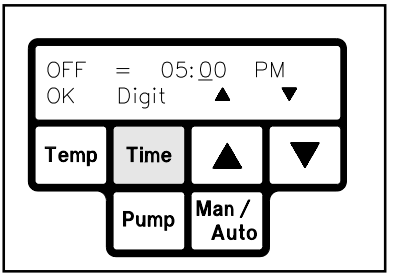
13. Press and release the **Temp** Key. The displayed message will now ask if you wish to change the Auto Schedule. If you wish to change settings, press and release the **Temp** Key. If you do not wish to change Auto Schedule, press and release the **Time** Key; proceed directly to step 18.



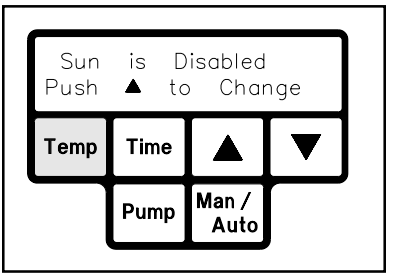
14. The stored turn on time is now displayed. Find the horizontal line beneath a digit of the displayed time. Use the **Time** Key to change the selected digit & the Scroll Keys to change the value of the selected digit.



15. Press and release the **Temp** Key. The stored turn off time is now displayed. Find the horizontal line beneath a digit of the displayed time. Use the **Time** Key to change the selected digit & the Scroll Keys to change the value of the selected digit.



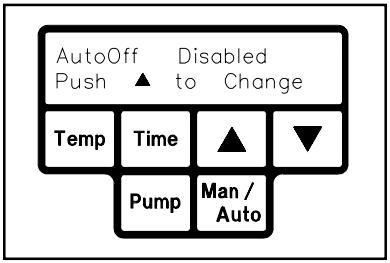
16. Press and release the **Temp** Key. A day of the week message is displayed with "is Disabled" or "is Enabled". Press and release the Scroll Up (▲) Key to change. If "is Enabled" is displayed, the on and off schedule will activate the system on that day for the specified time period when the system is used in the Auto Mode.



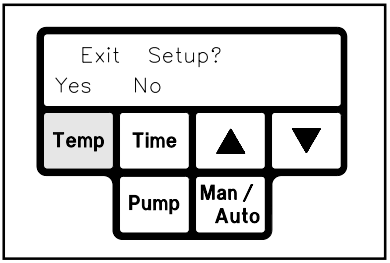
17. Press and release the **Temp** Key. The next day of the week will be now be displayed. Perform steps 16 & 17 until all 7 days have been set.

Auto Off

18. An Auto Off message will now be displayed with “Disabled” or “Enabled”. If “is Enabled” is displayed, the system when in the Manual Mode of operation, will remove power from the system if it is operated for 12 continuous hours. An hour glass graphic will also be displayed in the upper left corner of the digital readout (in normal operation) to indicate that the 12 hour timer is active.



19. Press and release the **Temp** Key. An “Exit Setup?” message will now be displayed. Press and Release the **Temp** Key to exit or press and release the **Time** Key to restart the Set-Up Mode sequence.



20. When the **Temp** Key is actuated to exit setup, the system will revert to normal operation and in the mode (Manual or Auto) in which the system was last used. Any setting changes are now stored in system memory.

Corrective Maintenance

Use the following Checkout Procedures (Table 4) to determine the source of a malfunction.

Symptom	Probable Cause	Checkout Procedure	Solution
No Digital Readout; no motor pump on Heat Wave Power Source. No heat to Hot Plate.	Power Switch in "0" (Off) position.		Turn Power Switch to "1" (On) position.
	Blown Fuse in power source.	Check for blown fuse in AC Receptacle of Heat Wave power source.	Replace fuse in AC Receptacle and recheck system.
No heat to Hot Plate. Digital Readout on power source functions normally.	Blown Fuse in Heater Unit.	Check Fuse in Fuse Holder on rear of Heater Unit.	Replace Fuse and recheck system.
	Open Heater.	Contact the PACE Service Department.	Replace Heater Assembly in Heater Unit.
No heat to Hot Plate. Digital Readout on power source displays "Open Sensor Check Heater".	Heater Unit Cable Assembly not connected to Heat Wave power source.	Check connection to HEAT CONTROL Power Receptacle.	Connect Cable Assembly connector plug to Heat Wave power source.
	Open Heater Sensor.	Contact the PACE Service Department.	Replace Heater Assembly in Heater Unit.
No Ground on Hot Plate.	Oxidation on Heater	Check resistance - round Ground pin on	Clean Heater Plate and Hot

Table 4. HS 200 Checkout Procedures

Listed below are the HS 200 system spare parts which may be ordered through your local authorized PACE distributor. To obtain any HS 200 parts other than those listed below, contact the PACE Service Department at Tel. #1-888-535-7223 (toll-free), Fax #(301) 483-7030.

Ite #	Description	Part Number
1	Hot Plate, 140mm (5.5 inch) inches square	1335-0177
2	Detachable Power Cord for 115VAC systems	1332-0094
	Detachable Power Cord for 230VAC systems	1332-0093
3	Pik-Vac Handpiece	7027-0001-P
4	Vacuum Cup Kit	6993-0154
5	PACE Screwdriver	1100-0230
6	Large Board Holder Kit (optional accessory)	7900-0045
7	PCB Support Kit	6993-0197

Table 5. Spare Parts

CAUTION

POTENTIAL SHOCK HAZARD - Disassembly of power source or heater unit exposes line voltage parts. Replacement of heater unit power cord or any internal parts must be performed by qualified service personnel only. Contact the PACE Service Department for assistance.

MANUAL IMPROVEMENT & COMMENT FORM

Instructions

1. Duplicate this form and submit comments on the copy. Keep the original to make future comments.
2. Complete all requested information.
3. Submit completed form to:

PACE Incorporated
Applications Engineering Fax: (301) 604-8782
9893 Brewers Court
Laurel, MD 20723-1990 U.S.A.

Document #	**5050-0406**	**Rev. C**	Date of Submission:

Nature of Change (Identify page and paragraph and include proposed rewrite, if possible.)

Reason for Recommendation

Name of Submitter:	Company or Organization:
Mailing Address:	Telephone: ( )
	Voice:
	Fax:
	e-Mail:

Thank you for your comments; they are greatly appreciated!